









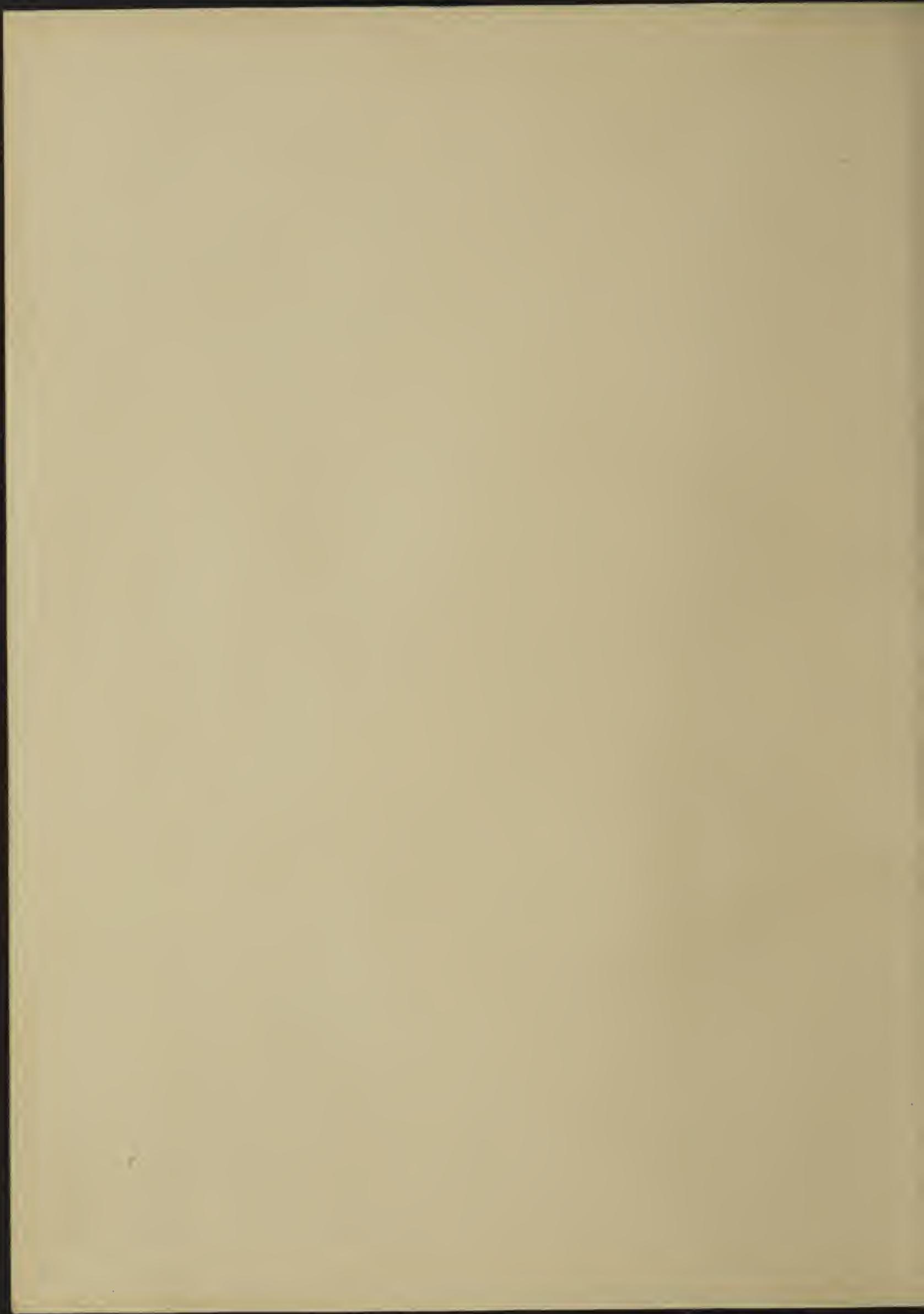


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FITZGERALD (Robert)









Salt-Water Sweetned;

Or, a TRUE I. 78243

ACCOUNT

OF THE

Great Advantages

Of this NEW

INVENTION

BOTH BY

Sea and by Land:

TOGETHER

With a Full and Satisfactory Answer to  
all Apparent Difficulties.

ALSO THE

Approbation of the COLLEGE OF PHYSICIANS.

LIKEWISE

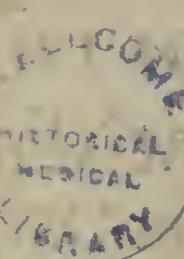
A LETTER of the Honourable *Robert Boyle* to a  
Friend upon the same Subject.

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November 18th. The Second Edition, with Additions.

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LONDON: Printed for *William Cademan*, at the Popes-Head  
in the New-Exchange in the Strand. MDCLXXXIII.



TO THE  
KING'S Most Excellent Majesty,

SIR,

  
HEN Mr Boyle, with my Partners, and my self attended your Majesty with the Experiment of Reducing Salt Water into Fresh; your Majesty seem'd so well pleas'd with an Invention of that Universal Benefit, That We cannot but with our Humblest Duty, acknowledge your Gracious Reception of it; However as your Great Wisdom, and Judgment is not easie to be surpriz'd, and your Royal Approbation never known to be your hasty Act of Grace; your Favour and Patronage was not fully obtain'd, till with the strictest Scrutiny you had first examin'd those Hopes and Probabilities, you vouchsaf'd to Encourage in Us.

But when upon further consideration, We had obviated all Difficulties, and solv'd all Objections against this Undertaking, (which We hope will appear in this Printed Paper,) your Majesty was Graciously pleas'd to give us your Approbation, and to Order Us your Letters Patents, which Grace and Favour, ought to be, and is receiv'd by Us with the deepest sense of our humble Acknowledgments and Gratitude.

And if the Fruits of your Royal Grant has not hitherto been deriv'd to Us, 'tis partly by some Obstacles we met from the suggestions of a private Person, but more especially by the late Horrid Conspiracy.

Conspiracy, when, not only our Loyal apprehensions for Your Majesties Danger, diverted our Thoughts from all other Concerns, but likewise we judg'd it a part of our Duty not to be pressing on your Majesties Goodness, or on your Ministers of State in so Important a juncture of Affairs: But having now re-gain'd Leisure and Freedom after the dissipation of the greatest part of our Fears, We presume a second time to lay these Endeavours at your Feet, as best Entituled to the Patronage of so great an Undertaking by your own Subjects, and best able to Recommend it to the World by your Royal Approbation.

This Experiment is in a great degree owing to the Eminent Mr. Boyle, and indeed well worthy so Ingenious a Promoter, being so much the more the Favourite of his happy Genius, as it is Universally useful to Mankind; But whatever Advantages this Country, or indeed the World may receive by it, his whole ambition is bounded in the publick profit, contenting himself with no other Benefit from it, than the satisfaction & pleasure of seeing it accomplish'd by his Friends.

The Advantages in regard to Navigation, especially in long Voyages, which are subject (through often Calms, and on several other accounts,) to distress, for want of Water, and the benefits to Sea-Towns, which are incommodated by Brackish Waters, Together with the Easiness, Cheapness and Wholsomness of this prepared Water, are the principal scope of these ensuing Papers, which are Humbly Dedicated to your Majesties Perusal, Favour, and further Approbation, by

Your Majesties most Dutiful, and

Obedient Subject,

R. FITZGERALD.

The fore-going Dedication Humbly offered to His Majesty, having discovered the Intention of this Undertaking ; it remains now to satisfy all Reasonable Scruples which have been raised concerning the Wholesomeness and Cheapness of Water thus Prepared.

The *Queries and Answers* follow.

Quest. 1. *If this Water can be made in sufficient quantities to serve the Uses of any Ship at Sea ?*

*Ans.* About Ninety Gallons may be Prepared in every Twenty Four Hours by an Instrument of 33 Inches Diameter, which will stand under the Deck of any Ship ; and it's computed that less than 3 Quarts is a good Allowance for any man in that time : And if a large Ship, wherein there are many men aboard should require more Water, then two or more of the Instruments may be had upon Reasonable Terms, and one man may attend several of them.

Quest. 2. *In case the Operation be by Fire, it may require a Skilful Chymist, or one knowing in such Operations, to be on Board every Ship, who will require great Wages ?*

*Ans.* There will be no occasion for any such person, for any Sea-man may be Instructed in an Hour or two to Prepare this Water.

Quest. 3. *It's probable that the Engine may be frequently out of Order, and being so at Sea where Artificers and Tools are wanting to Repair it, there must necessarily follow want of Water, which will be of Ill Consequence.*

*Ans.* This Engine is of such Contrivance, that it's never likely to be out of Order.

Quest. *Can this Engine be of use in Stormy-weather ?*

*Ans.* Since a sufficient quantity of Fresh-water may be so easily had by this Engine, the Marriners will be Careful to make a good Provision of it before-hand ; however 'tis not to be doubted but it will answer the worst Accidents of the greatest Storms, and have its Effect sufficiently in the worst Weather, especially considering that in such desperate Extremities men must be content with smaller Allowances.

Quest. 5. *The Operation being by Fire it may endanger the Ship, and the Smoak be very offensive ?*

B

*Ans*

*Ans.* The Engine may easily be placed in any Ship without danger of Fire, or offence of Smoak.

*Quest. 6. Will not the Charge of this Instrument and the Materials belonging to it be very great ?*

*Ans.* It is difficult to make exact Answer to this, but an Instrument of the largest Size, with all the Materials belonging to it, will not amount to above Sixteen Pound at most, and may last many years, and according to the Rates of Ships they may be proportion'd both in Bulk and Price. And where it may be thought Necessary to make use of this Experiment, on Shore, for Brewing, or other uses of a Family, Instruments and Materials may be very Large, and very much cheaper on Shore, then at Sea.

*Quest. 7. Will not the Jewel be very Chargeable, and take up much Room in the Ship ?*

*Ans.* This Operation is caused by so little Fire, that it will be very Cheap, and the Provision need not be great, nor the trouble of Stowing it in a Ship.

*Quest. 8. Will not the Ingredients take up much Room, and be very Chargeable ?*

*Ans.* A Vessel less then a Barrel may contain enough of the Ingredients to carry a Ship to the East Indies and back again; and the Ingredients for one hundred Gallons of this Sea-Water will not amount to above Fourteen Pence at most. And will be Cheaper when great quantities are us'd at Land.

*Quest. 9. Admitting this Preparation of Water may be made, and in sufficient quantities, it may be doubted whether it be wholesome ?*

*Ans.* The Famous Lord Bacon having written Learnedly of this Subject, had not the least thought that the Sea-water after it had been Dis-salted, without any Noxious addition, was Unwholesome, and it neither now is, nor ever was really doubted whether it were Wholesome : However, because invidious persons, who are no well-wishers to Ingenious Designs, may possibly raise Scruples, the Gentlemen who are concerned in this Grant, have purposely to give Publick Satisfaction, sent a large quantity of this Water to Doctor King, a very Ingenious Physician, who is a Member of the Colledge, and of the Royal Society ; who finds,

1. That it is Lighter than most of the Waters about the Town.
2. That it is without Sediment, and Transparent as any other Waters.
3. That it Lathers, (as they call it,) with Wash-Ball or Soap, better than other Water, and with less Soap.
4. That Sugar dissolveth sooner in it, than in other Water.
5. That it Evaporates sooner than common Water.
6. That whereas common Water Putrifies, and yields a Stinking Smell within a few Weeks, this has continued Sweet and unaltered several Months, and

and may yet do so much longer, being still in as good condition as it was above Eight Months ago, November the 15th. 1683.

7. That it makes Gellies as firm and good as any Water.
8. That it Boils Pease to Tenderness, Beef, Mutton, Fish, and all other Meat, without giving it an ill Taste or Colour.
9. That it has no kind of ill Taste in it self, and Boils in Milk without Curdling.
10. That Flowers, Plants, and all Vegetables grow in it at least as well as any other Water.

11. And that small Animals Live and grow in it.

Several men of great Quality, viz. The Earls of Shrewsbury, Westmorland, Mulgrave, the Lord Dunbar, Lord Lumley, Lord Falconbridge, and Lord Chumley, besides several Gentlemen of Quality who frequently drink Water, Officers of Sea and Physicians have Drunk of this Water without being in the least indispos'd after it; but lest any doubts may remain, after this, of the Salubrity of the said Water, the following Testimonial of these Learned and Eminent Physicians is here inserted. And a further account of new Experiments made by an Ingenious Physician, is now ready to be Printed.

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*The Approbation of the Colledge of Physicians, and of other Doctors of Physick, Practising in and about London.*

WHereas we have received an account in a Garet published some months since, that the Honourable Robert Fitz-Gerald Esq; hath found out the way and means of reducing Salt-water into Fresh, in quantities sufficient to serve Ships at Sea. And forasmuch as some persons may possibly make a doubt, if the said Water be wholesome after the Salt is taken out of it. We therefore considering of what general advantage, this useful Experiment may be, having fully inform'd our selves from Mr. Boyle, that the said Experiment is made by Fire. And having also seen an account of some Experiments made by some Members of our own Body, do declare Our opinion, that We believe the said Water is very wholesome, and may be safely us'd. And being further acquainted by the said Mr. Boyle, that the very few Ingredients made use of in the said Operation, are fix'd in the Fire, and give no noxious quality to the Water; We are therefore of Opinion that the same may be safely

safely us'd, and is at least as Healthy as any other Water us'd at Sea. All which  
We certify ( at the Request of the Honourable Robert Fitz-Gerald. )

D. Cox President,  
Sir C. Scarborough K<sup>nt</sup>.  
Dr. Daniel Whistler,  
Dr. Weatherly,  
Dr. Will Denton,  
Sir T. Millington K<sup>nt</sup>.  
Dr. Walter Needham,  
Dr. Thomas Short,  
Dr. Thomas Allen,  
Dr. Edmond Dickingson,  
Dr. William Croone,  
Dr. Richard Lower,

Dr. John Windebank,  
Dr. Daniel Cox,  
Dr. James Rufine,  
Dr. Charles Conquest,  
Dr. Edmond King,  
Dr. Willoughby,  
Dr. Thomas Sydenham,  
Dr. Edward Tyson,  
Dr. Nehemiah Grew,  
Dr. David Abercromby,  
Dr. Andrew Creagh,

Though Physick has always Flourished in this Kingdom, yet in this Age, it is in greater perfection then ever ; being improv'd both as to the Practical and Speculative part, by the present Fellows of the Famous Colledge of Physicians ; who being Men of great Practice and Eminent Learning, cannot but give full satisfaction to all such as inquire concerning the healthfulness of this Water ; Their Opinion being in this particular, the more valuable, because it is to their own disadvantage ; since the Brackish Waters of the Sea-Coast, and the putrifying Waters made use of at Sea, might probably have afforded them a great number of Patients, which may hereafter be lessened by the use of this wholsom Water.

Since the first Edition of these Papers his Majesty has been pleas'd to see some Experiments, which has so convinced His Majesty of the healthfulness of this Water, that he has resolved to have it generally made use of in his Sea-Port Garrisons ; of which an account has been given in several *Gazets*, by His Majesties Special Order.

### *The Benefits and Advantages of Sea-Water made Fresh.*

**M**uch Stowage will be saved, so that a Ship of 50 or 60 Tun, and proportionably of greater Bulk, may take in several Tuns of Goods more than they formerly used to carry ; which will considerably advance the Trade of all Merchants, and be of vast profit to the Masters or Owners of Ships.

The Charge of Casks is very considerable, especially when bound with Iron

Iron, as all Sea-Casks must be ; And by means of this Engine, three fourths of that charge will be saved.

The tear and wear of Boats often going from Shipboard, and frequent loss of the Boats and men in Stormy weather , and the opportunity of the Seamen being Drunk on shoar ; by which many fatal accidents do happen, (by means of having this Water-Engine) will be prevented. :

Ships in long Voyages have been forc'd to run many Leagues from their intended course, which much retards their Voyage , and makes them lose fair winds, and maintain more Sea-men at charges of Diet and Wages than they have occasion for ; which inconveniences may be prevented by having Water within themselves.

Ships are often forc'd to leave their Ankors and Cables behind them, by being forced into dangerous Shoars upon account of taking in Fresh Water.

In the *African, East and West India Voyages*, great quantities of Fresh Water are necessary, which the Sea-men are forc'd to put above Deck for want of room, which is great hindrance to a Ships Sailing , and much endangers and weakens a Ship.

In case of Calms, which often happen in the narrow Seas, but especially near the Line, this Instrument will be of vast Advantage by affording fresh and wholesome Water, instead of that which is unwholesome and offensive.

*Essex, Kent, and all other the Sea-Coasts*, in any part of the World that want wholesome Water, may be easily and cheaply supplyed by this means ; as also *Venice, Amsterdam, Rotterdam*, and all other Towns or Places that lye near the Sea, and either want good, or have Brackish Water.

In time of War, whole Navies may be relieved by this Engine, and opportunity given of making the greatest discoveries imaginable.

It is further to be considered, that hitherto the richest and ablest bodied Sea-men have been averse from undertaking long Voyages by reason of endangering their healths , and lives, by making use of putrified Water, which inconvenience is not now to be feared; there being such useful hopes of Fresh Water by the use of this Engine ; and possibly a smaller number of men may serve the use of Ships then do at present, by which much Charges will be saved to the Masters and Owners of Ships ; and Merchants may Trade upon easier Terms.

In *Portsmouth, Rochester, the Fens of Lincolnshire*, and any other places near the Sea, where Waters are Brackish, and consequently unwholesome, this Engine, &c. may be very useful, and where there is room enough to place it, very great quantities of Water may be had for the use of whole Families and the Ingredients when used in great quantities may be afforded at a Cheaper Rate.

A LETTER of Mr. BOYLE S, to the Learned Dr. JOHN BEALE Fellow of the Royal Society, concerning Fresh-water made out of Sea-water, Printed at the desire of the Patentees.

S I R,

To give you a short account ( suitable to the little time I have to do it in, ) of the Transaction, which I suppose must have given the rise to the mention made of my Name in the publick Gazet; I must inform you, that one of my nearest Relations, ( Captain Fitz-gerald, ) and some other Worthy Gentlemen, having acquainted His Majesty, that They had an Invention for making Sea-water sweet and wholsom in great quantity, and with small Charge, and that I had examin'd, and did approve the Water so prepar'd; His Majesty was pleas'd with very Gracious Expressions, to command Me to attend Him with a further and more particular Information. Having readily obey'd this Order, and been made acquainted with the Objections the King thought fit to make against the Practicableness of the Invention; which, ( tho a private Man had urg'd them, ) I should think the most Judicious that have been fram'd against it; I Humbly represented to him, that I look'd upon this Invention as Comprizing two differing things; a Mechanical part, which related to the Engine it self, and the use of it a Ship-board, and a Physical part which concerns the Potableness and Wholsomness of the Liquor. About the former of these I did not pretend to clear the Difficulties, especially such strong ones, as His Majesty had propos'd; but left it to the Patentees to give Him Satisfaction, which they were in a readiness to offer. But as to the Wholsomness of the prepar'd Water, I had made some Tryals upon that Liquor, which gave me no just grounds of suspecting it to be unwholsome, but several motives to believe it well condition'd, and of great use to Navigators, and not to them only. And having hereupon briefly acquainted His Majesty with the chief Tryals I had made to examine this Sweetned Water, He was pleas'd to look upon them as Satisfactory, and vouchsafed on that occasion to discourse as a Virtuoso of the Sea and Brackish-Waters, and gave me some new, as well instructive Observations about them: and in conclusion, dismiss'd the Patentees with a Gracious Promise of His Royal Protection, and peculiar Favour.

To this short Narrative it now remains, that I briefly Subjoyn the chief things that perswaded me of the Salubrity of this Water, ( whence may be justly and easily

easily inferr'd, the Utility the Publick may receive by a cheap and easy way of preparing it.) First, then I consider'd that almost all the Rain-water that falls from the Clouds on the Main Ocean, and which (except perhaps in very few places in torrid Climates) is unquestionably receiv'd as wholsom, must be afforded by the Sea, and consequently be but Sea-water free'd from its Salt (according to the Famous Motto, Redit Agmine dulci.) Next I found, (as His Majesty Himself had done,) that the Liquor was well tasted, and without any sensible Brackishness; and so some of it continued for between 4 or 5 Months in a large Crystal Bottle, that I purposely kept un-stopt, and for the most part in a South Window, where it neither did, nor probably in a long time, will putrifie, or so much as appear troubled or less transparent; during which time it was with Approbation tasted and smell'd by several Learned Physicians of the Famous Colledge of London. Thirdly, I found it laver very well, which most Pump-waters, and many others that have some little (tho' unperceiv'd) common Salt in them, will not do. Fourthly, this Water will boyl Pease tender, which amongst Sea-men is one of the principal signs of good Water. Fifthly, In very good Ballances with an Instrument that I purposely caus'd to be made for the nice weighing of Liquors, I found this Water far less heavy than one would expect, for if it differ'd at all in weight from the like quantity of undistill'd Water, (I speak with an If, because it is far more difficult to be exact in such nice Tryals, than the unpractic'd will imagine) the difference was not considerable, being but 1 part in 400, and that difference is very small in comparison of that which Navigators and Learned Authors relate to be observable in natural Waters, all of them good and potable: I might tell you on this occasion; that the last great Duke of Tuscany, who was an Eminent Virtuoso, and the Patron of the Celebrated Academy of the Lyncean Philosophers, is affirm'd among other prudent courses that he took for his Health, whereof he was very Solicitous, to have constantly made use of Distill'd Water when he us'd any Water, for his own Drinking. And I could add other things favourable enough to the Patentees Water, if Haste, and perhaps Discretion too, did not oblige me to leave them yet unmention'd, that I might now have time to say somewhat of the main thing of all that convinced me of the Saltlessness of the Water I speak of. I consider'd then, Sixthly, That the thing that was aim'd at by those Ingenious men, that at differing times, and in several Countries have attempted to make Sea-water Sweet, and the thing that was requir'd by proposing Recompences, or otherwise to Encourage the Makers of such Attempts, was to Free the Sea-water from the Brackishness without any Noxious Additament: so that on all sides it was taken for granted, that the only thing that kept the Sea-water from being safely Potable, was its Brackishness. From which Reflection it was natural for Me to infer a Conclu-

sion very favourable to our prepar'd *VVater*: For having long since written a short Discourse of the Saltiness of the Sea; I had been Industrious to devise ways of comparing *VVaters* in point of Brackishness. And by these I found the Patentees *VVater* to be more free from Common-salt, than *VVaters* that are usually Drunk here in London, of which I remember I shew'd those Gentlemen an Experiment that surpriz'd, as well as convinc'd them. And that which more satisfied me my self, was a Tryal that I carefully made by a way which having mention'd, but not yet (for want of opportunity) disclos'd to His Majesty, the Respect I owe Him forbids me to impart without His leave: On which account I hope you'l be content to be at present assur'd, of these two Things; One, that by this way of Tryal, I found, (what possibly you will think strange;) that if there were in *VVater*, so much as one Grain of Salt, in above two Ounces of *VVater*, I could readily discover it: The other, that even by this Critical Exam'en, I could not detect so much as a Thousandth part of Salt in Our Prepar'd *VVater*; whereas I found by Tryals purposely and carefully made, that our English Sea-*VVater* contain'd a 44, or 45th. part of good dry Salt; or, which is all one, that 44 Pints, or near so many Pounds of Marine *VVater*, would yield about one Pound of dry Common-Salt.

Thus Sir, you have a short and Art-less Account, such as my hast will permit, and the nature of the Subject requires, of my part in promoting this Profitable Invention; to which I own my self a great well-wisher, not out of any private Interest (tho that was obligingly proffer'd me by the Patentees,) but as I think the bringing it into general use may prove a real Service to Mankind, upon the Score of divers Utilities and Advantages, which yet, (tho' I had leisure,) I should think very needless to enumerate to so discerning a Person as Dr. B. to whom I shall therefore hasten to Subscribe my self.

SIR,

A very Affectionate Friend and Humble Servant  
R. BOYLE.

The Gentlemen Concern'd in this Grant, are the Honourable Robert Fitz-Gerald, Collonel Oglethorp, Mr. Bridgeman, Mr. Thomas Maul, and Mr. Patrick Trant, who intending the General Good as well as their Private Advantage in this Design, do intend as soon as these papers be made publick, to agree with all such as are willing to deal with them for the Instruments and Ingredients; which concerning so nearly the Lives and Healths of men, shall be carefully made up under such sure and private marks, that it shall be very hard (if possible) to Counterfeit them.

If any Corporation, Body of People, or Private Persons, are willing to be concern'd herein, they may please to direct their Letters to any of the Patentees before-mentioned, at the Carolina Coffee-house near the Royal Exchange, or at Will's Coffee-house in Bow-street in Covent-Garden, or to Mr. John Pye in Brook-street near Holbourn, who is the Person appointed by the Patentees to receive such Papers as are intended for them.

A Copy of a Letter from Captain Macdonnel, from  
aboard his Majesties Ship the Grey-bound, near the  
Coast of Spain, to one of the Patentees of Sea-  
Water.

S. I. R.,

FOR these Four Months past, I kept your Sea Water (for its better Tryal) Buried in my Ships Hold, where, had it not been extraordinary good, it must infallibly have been of no use, and offensive, but I'le assure you it prov'd quite contrary ; for yesterday having several both of Sea and Land Officers on board of me, I made them insensibly taste of your Water, which I pretended to be from a Spring I watered my Ship at, Ten Leagues to the Southward of Sallie ; they all affirm'd it to be as good as Tangier Water, the very best counted in the Streights, but when I discovered the Water to be yours, they hardly would give it credit, and approv'd of it (as really it is as good as can be drank) which they desired me to let you know.

I am

Novemb. 3d.

1683.

Your Humble Servant,

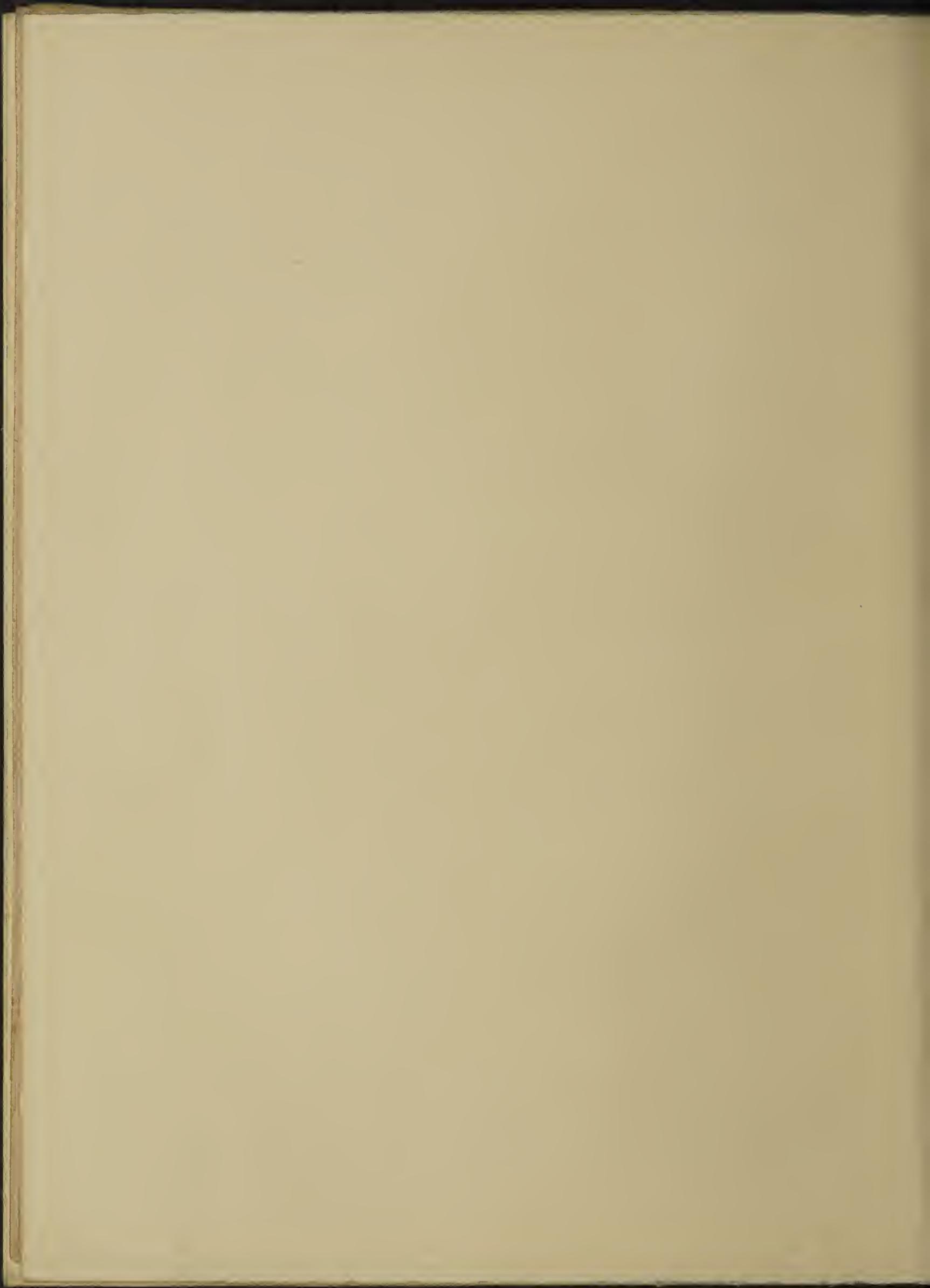
Rand. Macdonnel.

An ABSTRACT out of the Gazette,  
Number 1876.

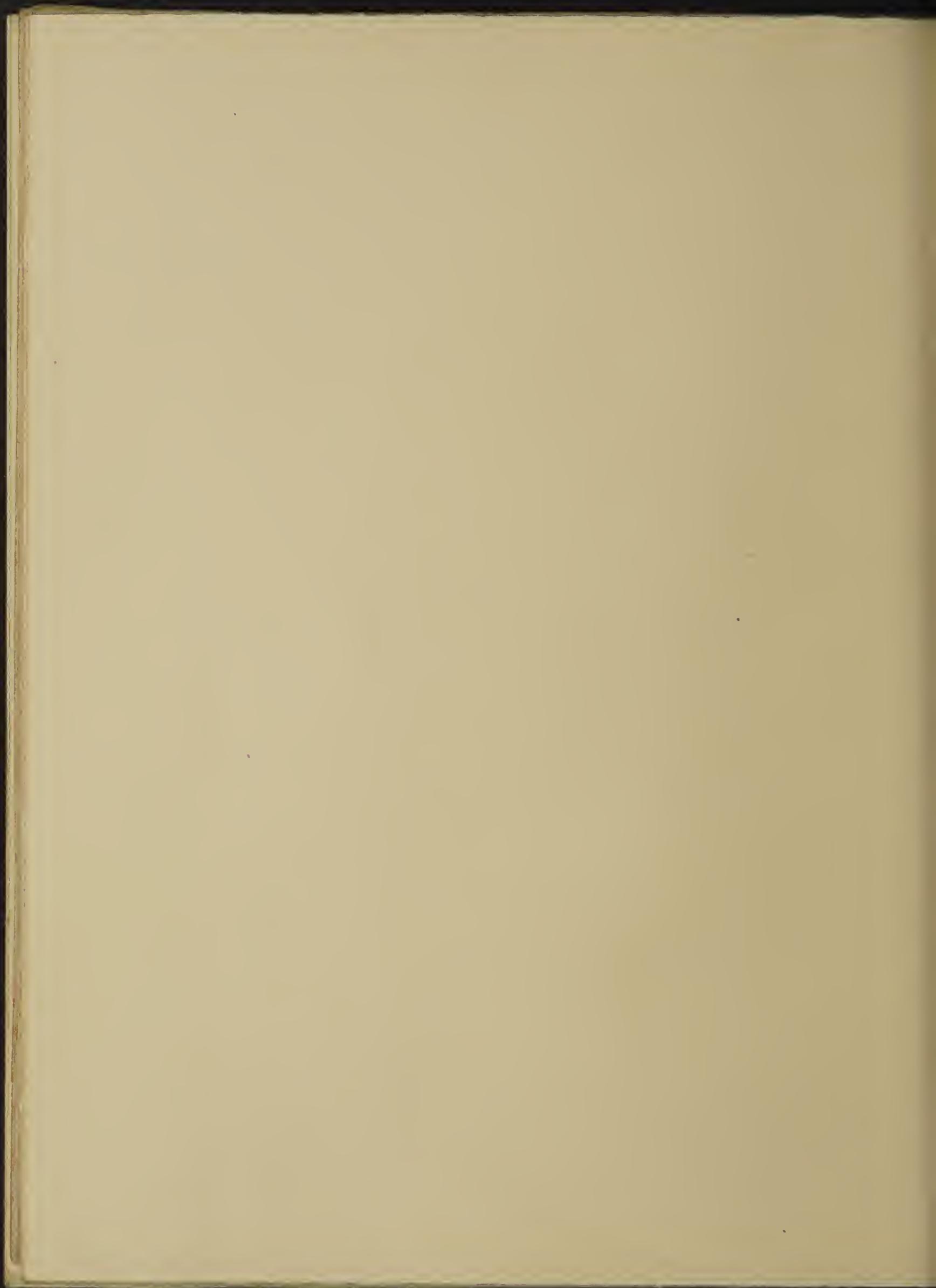
Whitehall Novemb. 2. 1683. His Majesty was pleas'd to Command the Honourable Mr. Boyle, to attend Him to give His Majesty an Ocular Proof of the Nicety of his way of examining the Freshness and Saltness of Water, and to apply it to the Sea Water, prepar'd according to the Patentees Invention; which being done before His Majesty, his Royal Highness, and the Duke of Grafton, several Persons of Quality being also present, it was made apparent by a certain prepar'd Liquid which Mr. Boyle had brought with him, that a Discovery could be made if there were so much as a thousandth part of Salt in a propos'd Water: By which Tryal His Majesty finding that the Prepar'd Sea Water, for which He has granted His Royal Patent, was at least as free from Salt as the best Waters used in this Town; received such satisfaction as to the wholsomness of the said Water, that He was pleased to declare his Royal Intentions both to encourage the said Invention, and to have the said Water made use of in His several Maritime Garisons, which Nature has not furnished with wholsom Water.

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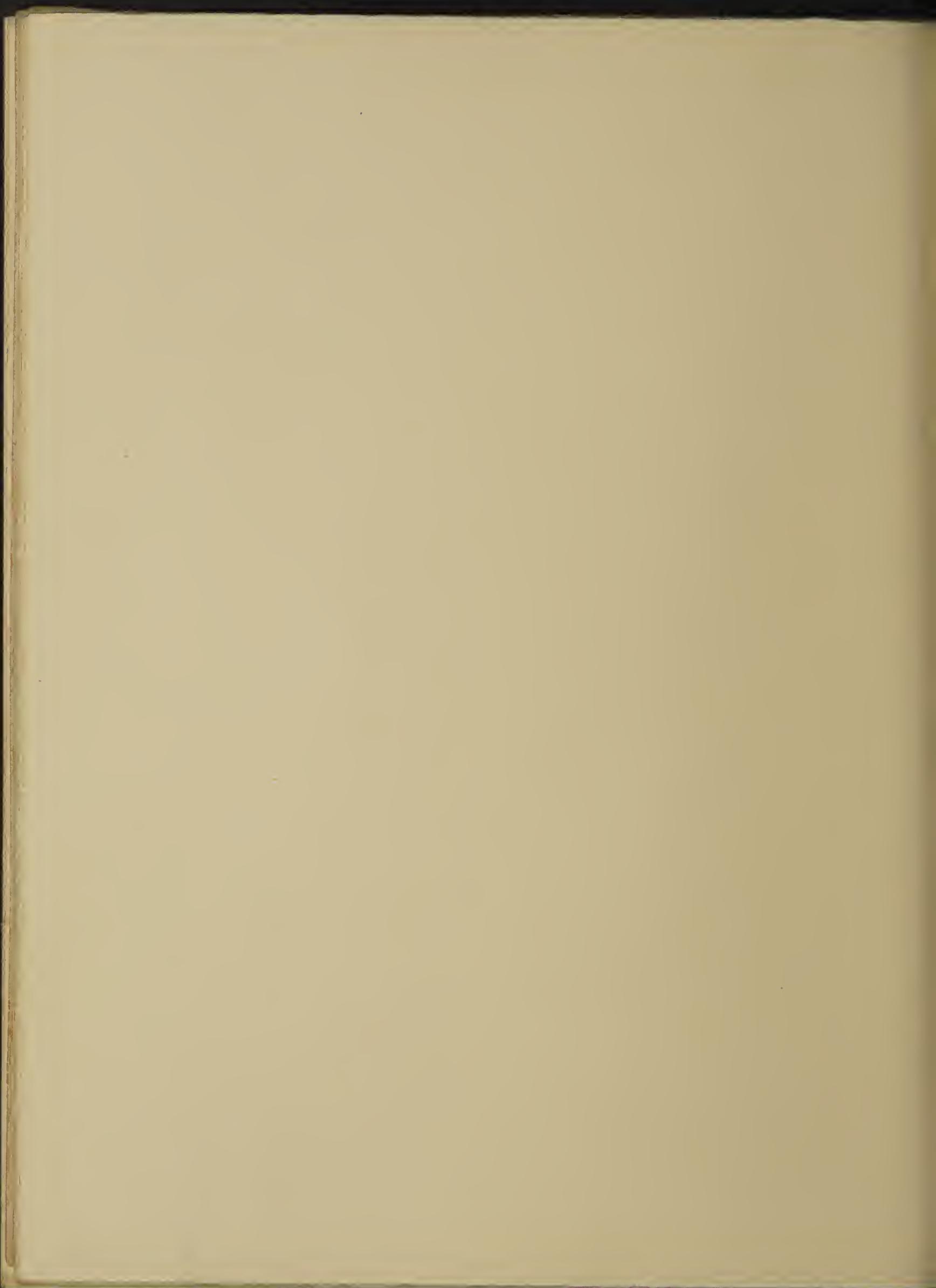




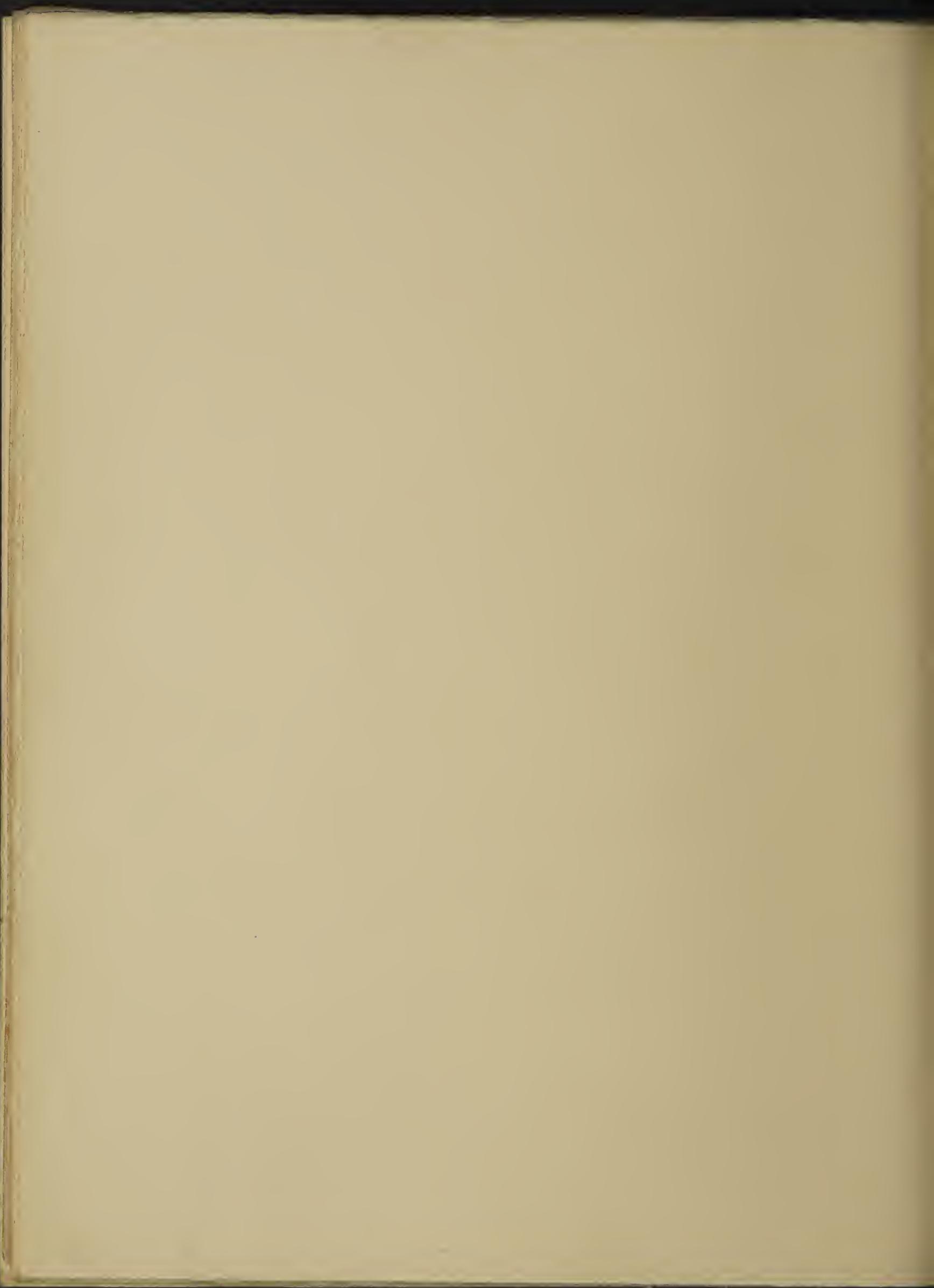




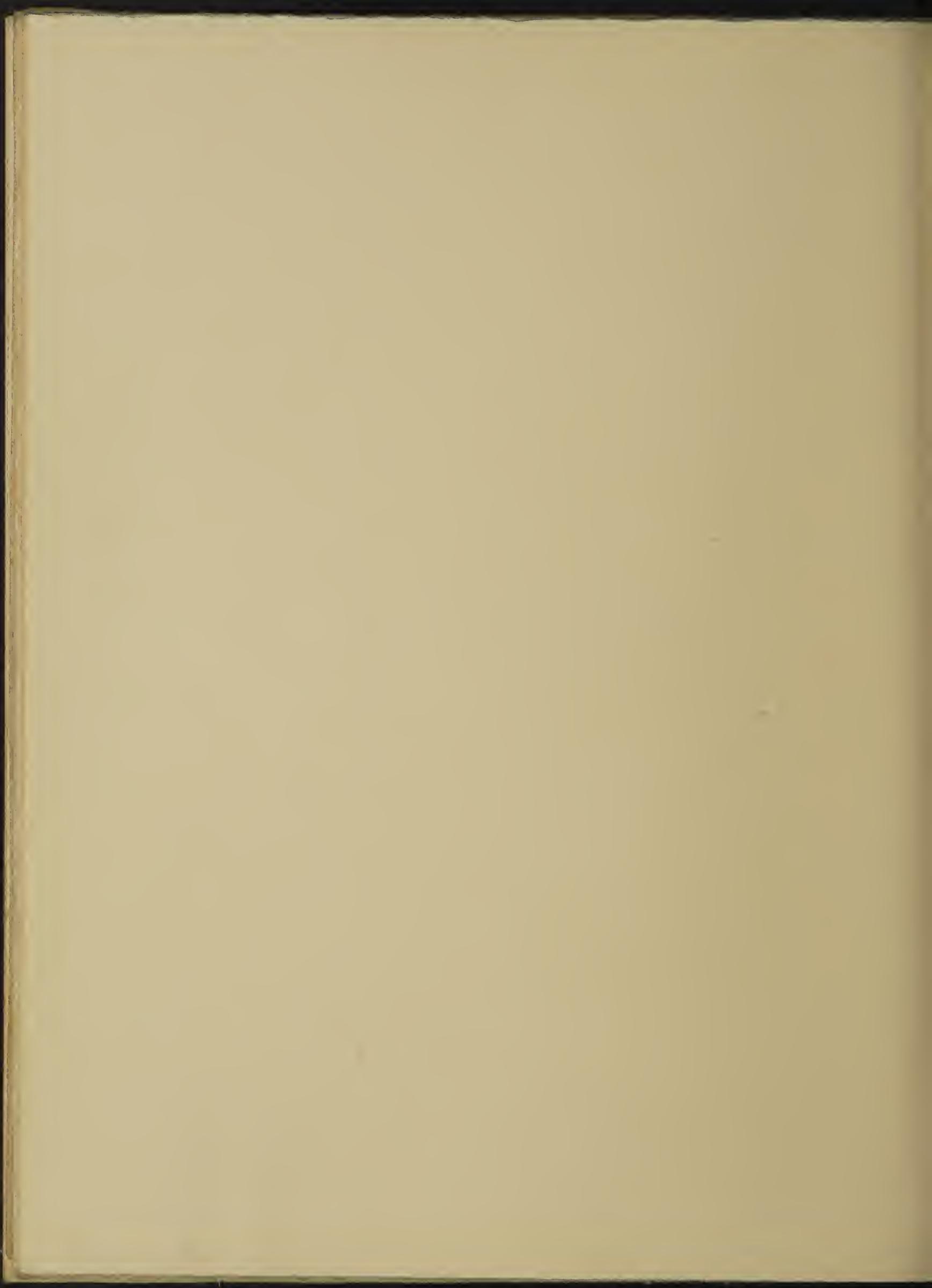




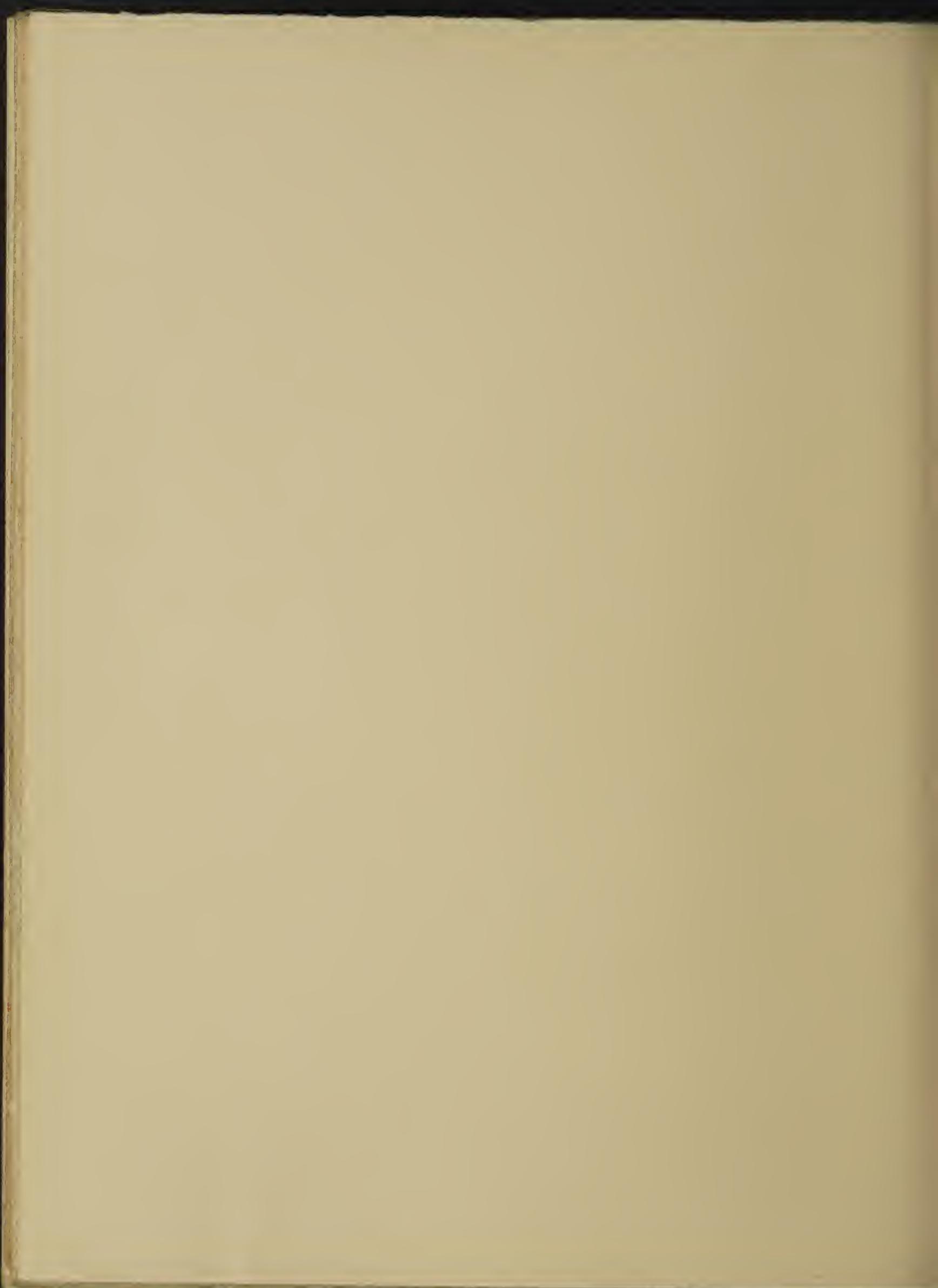




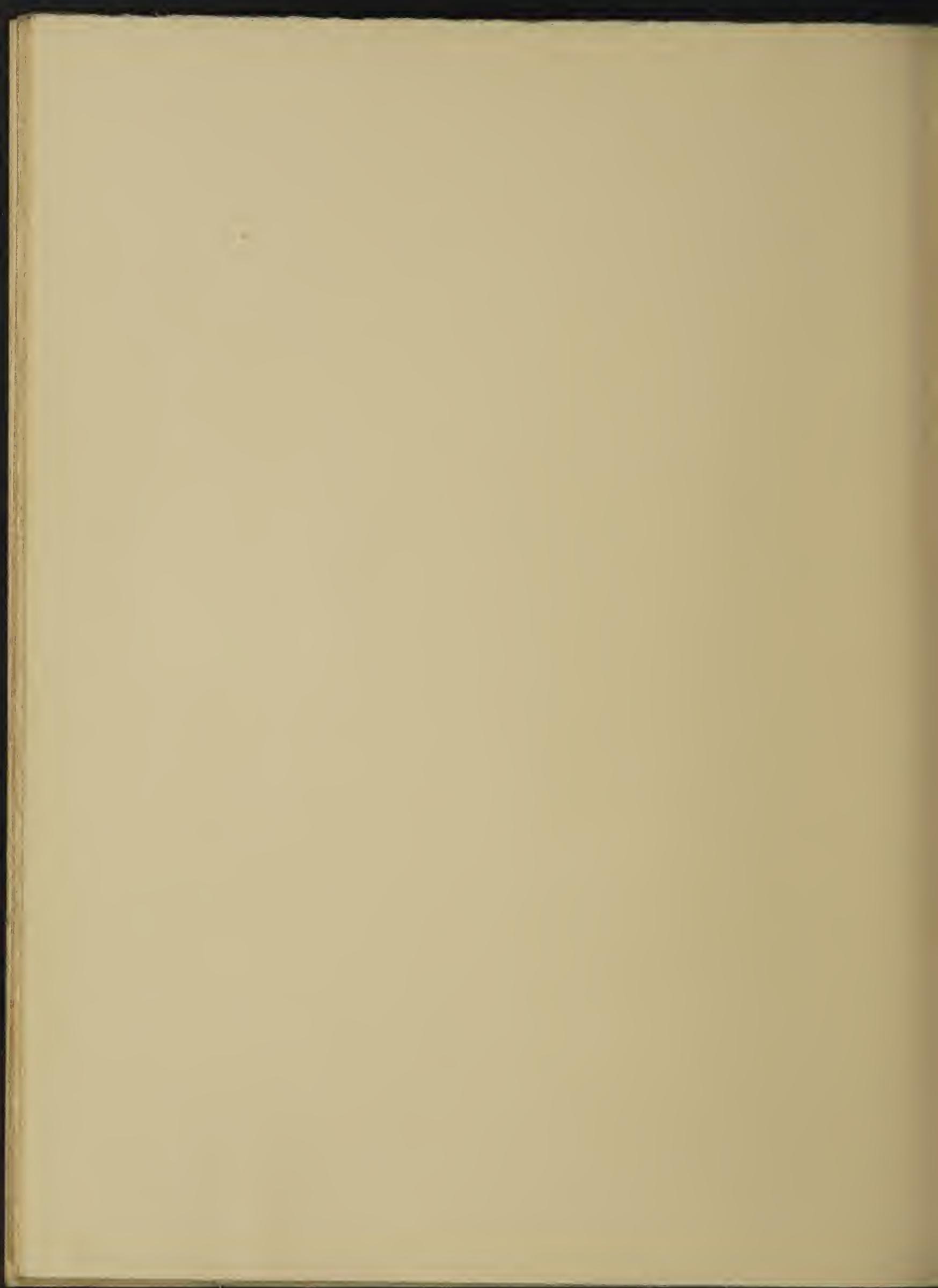




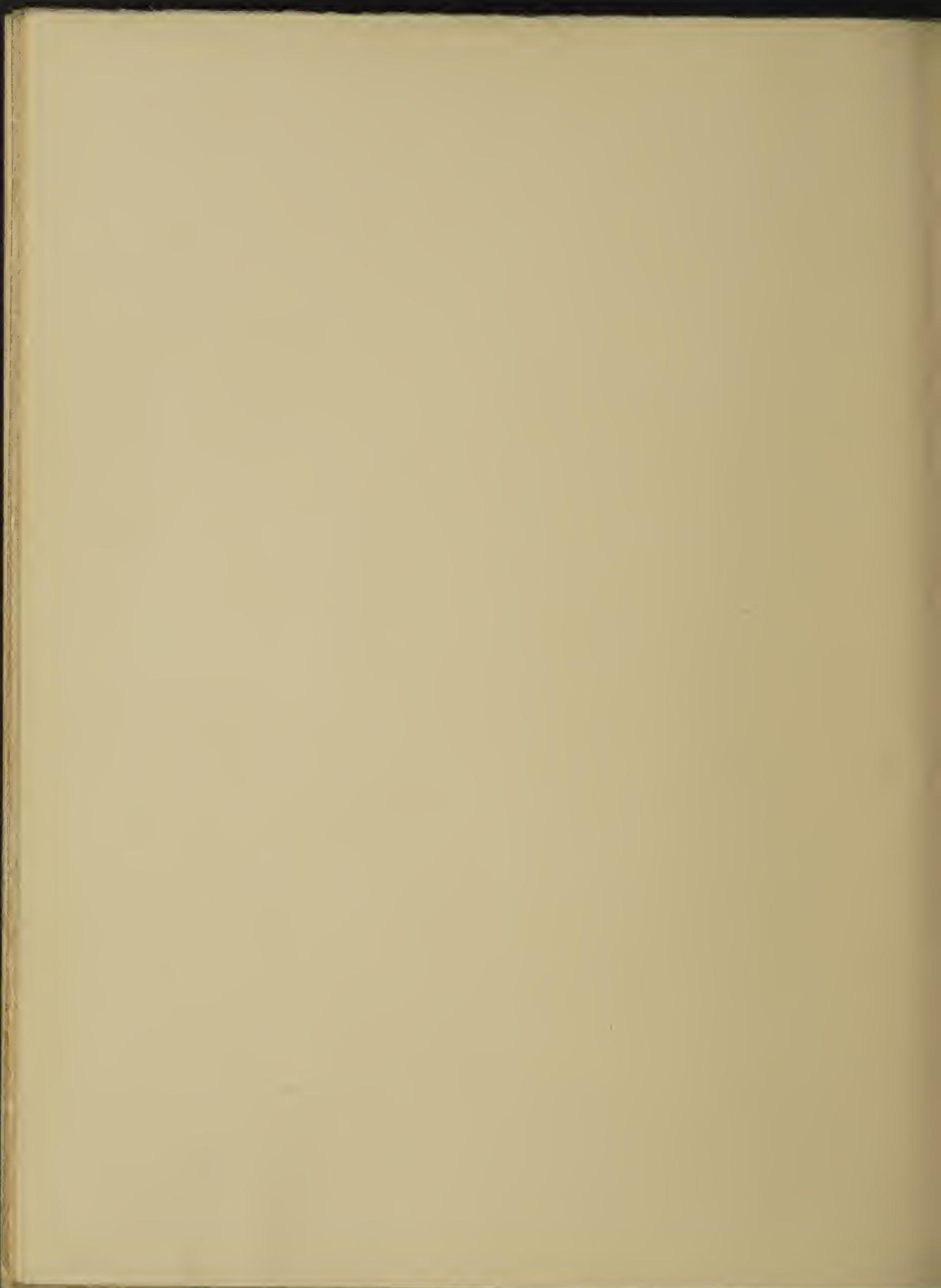




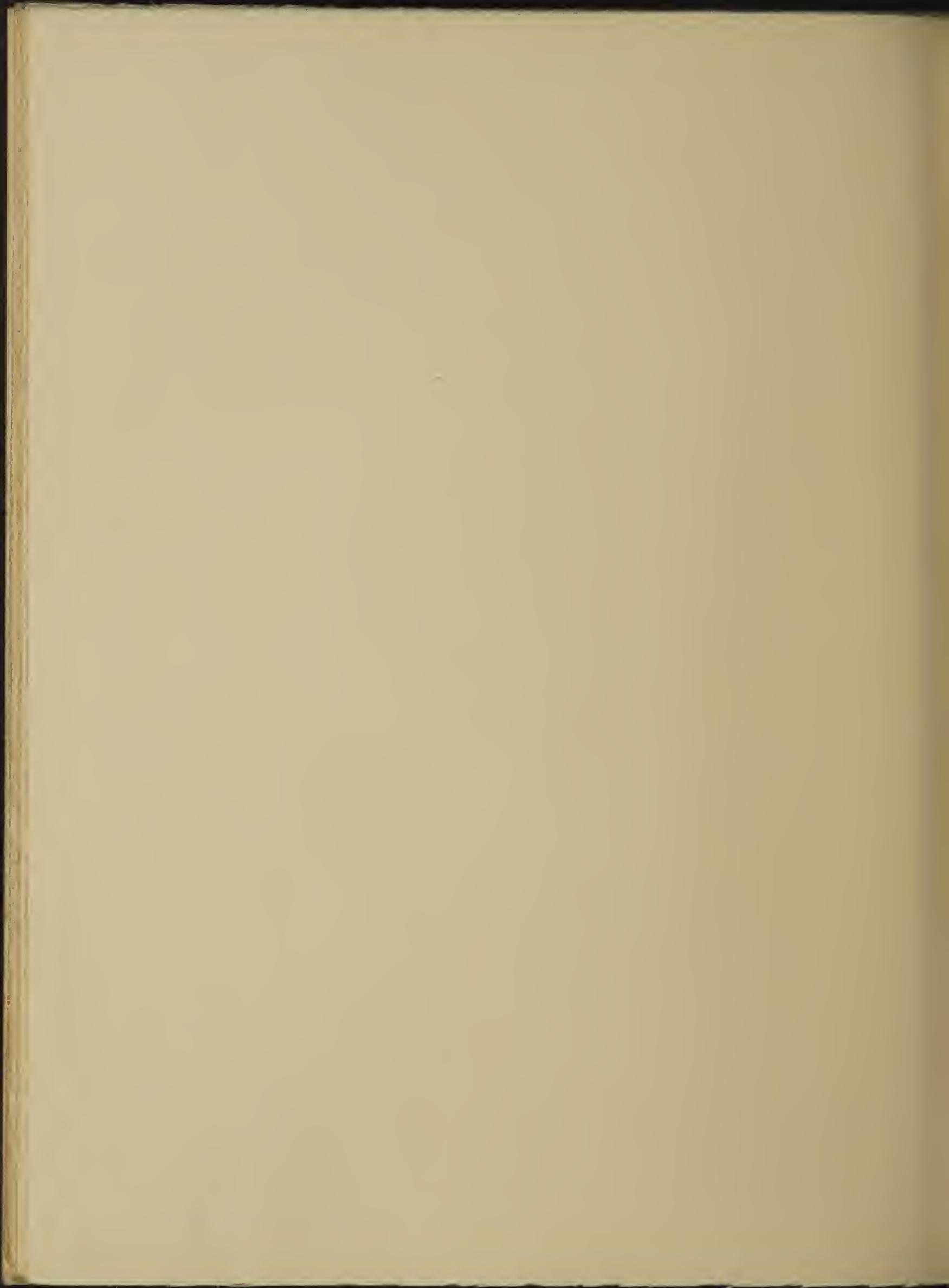




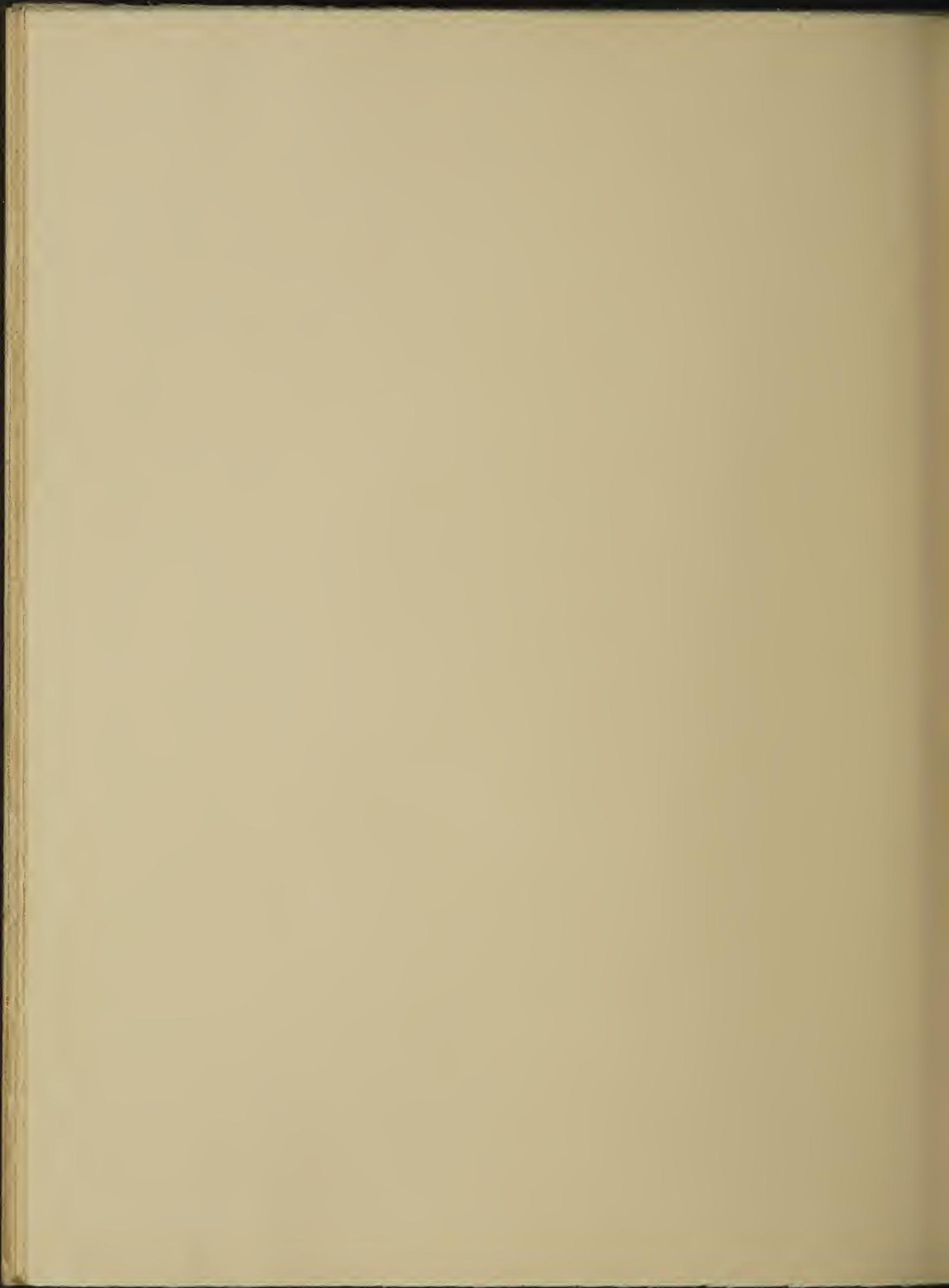




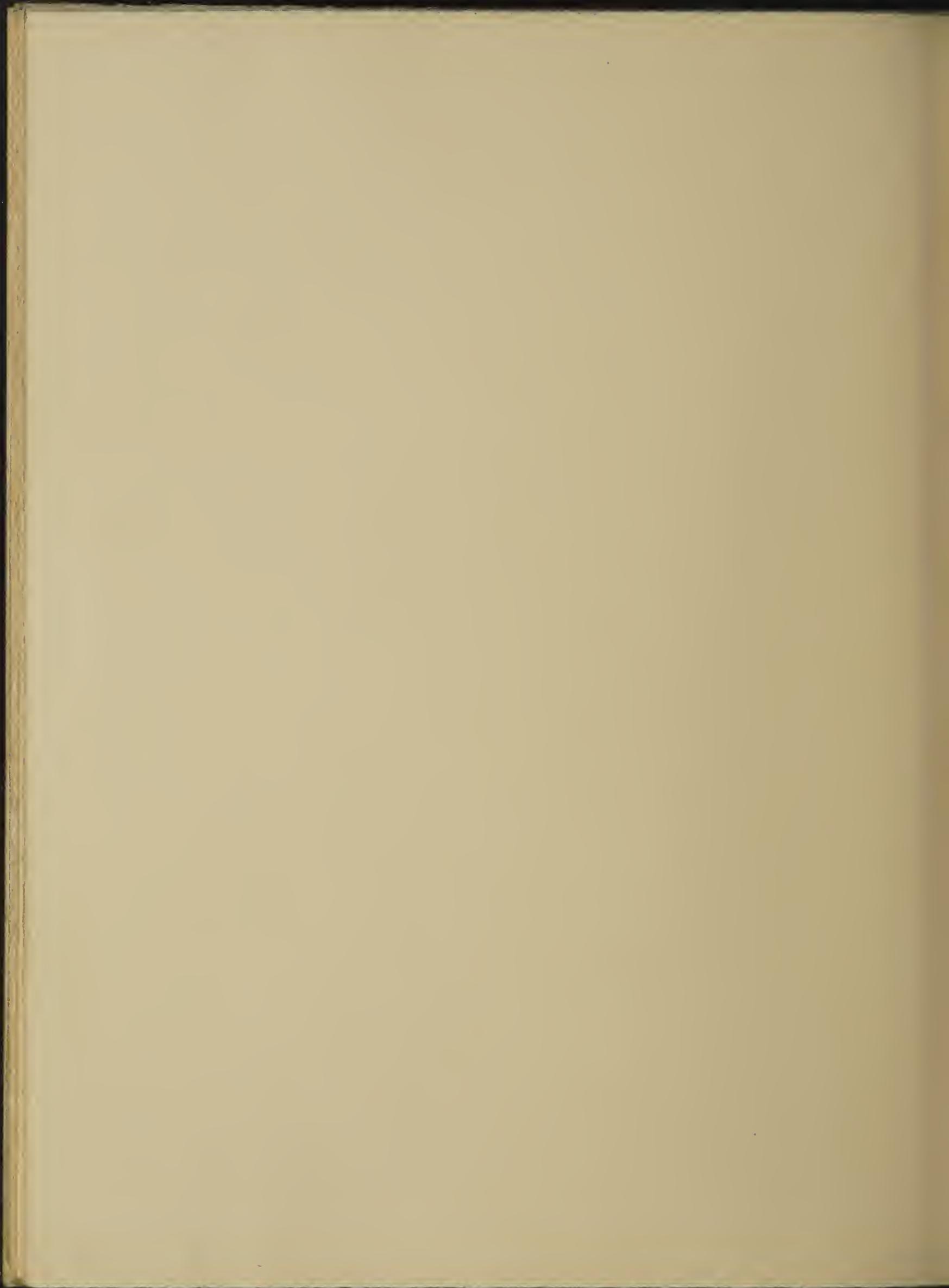




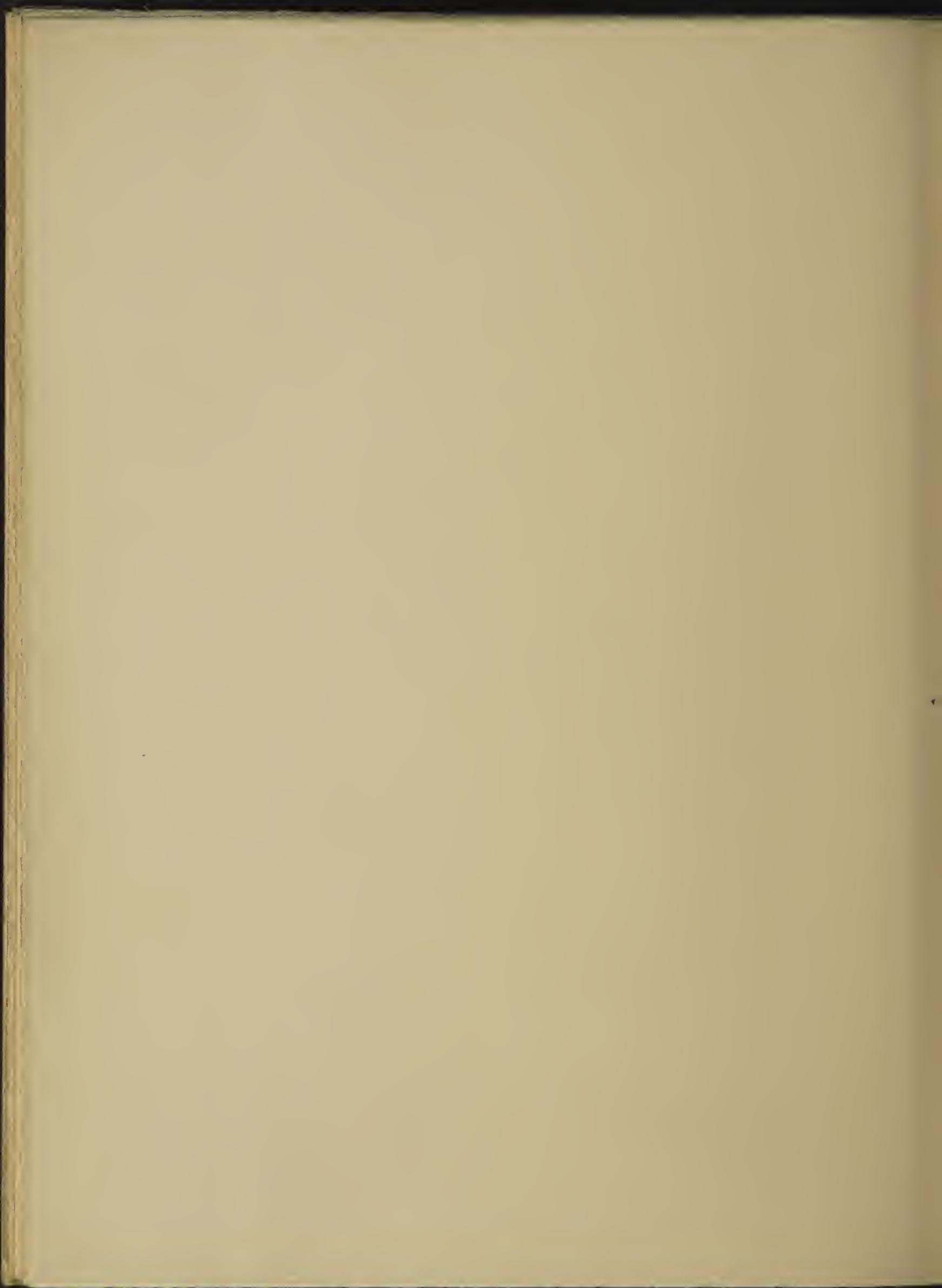




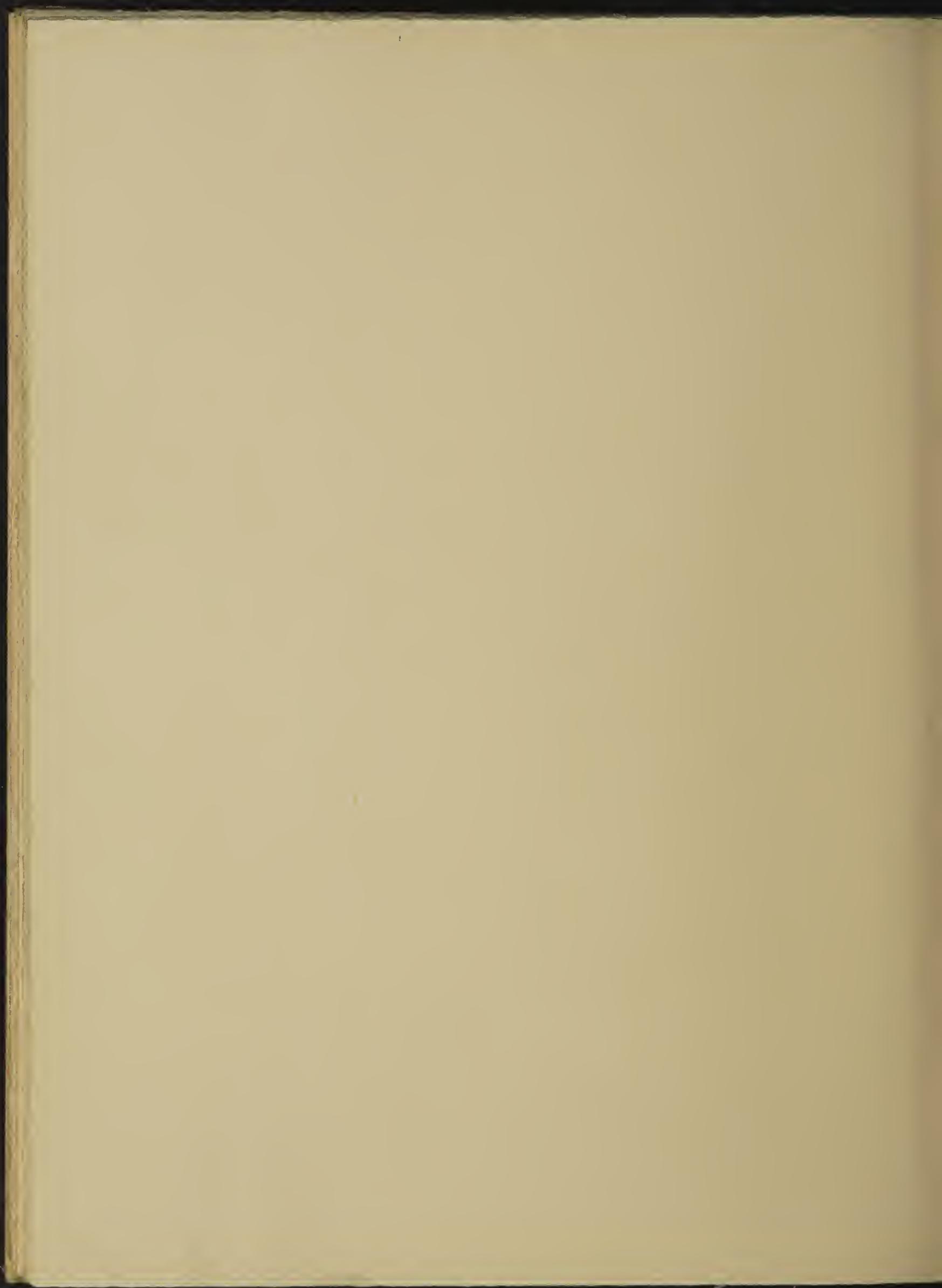












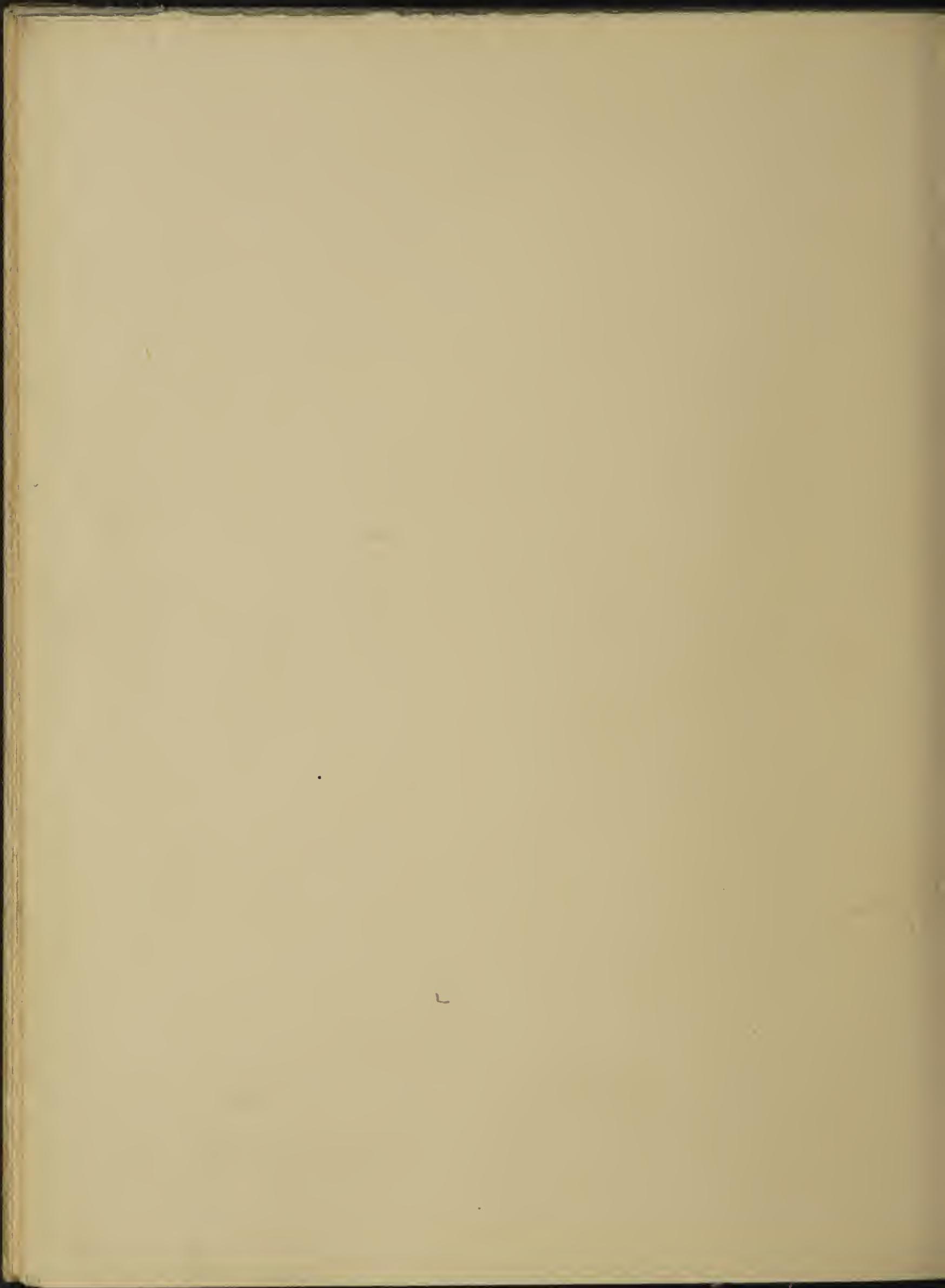




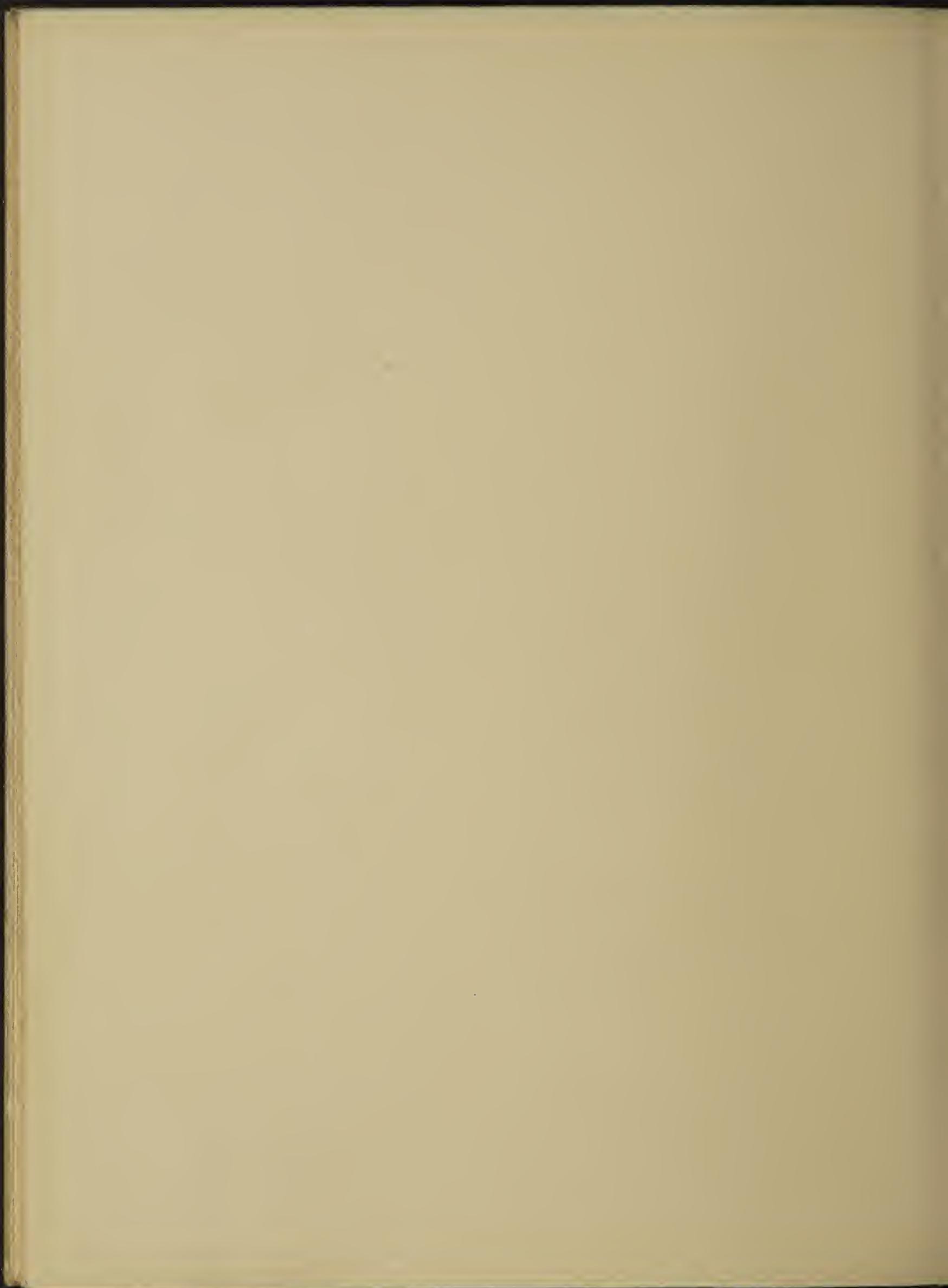




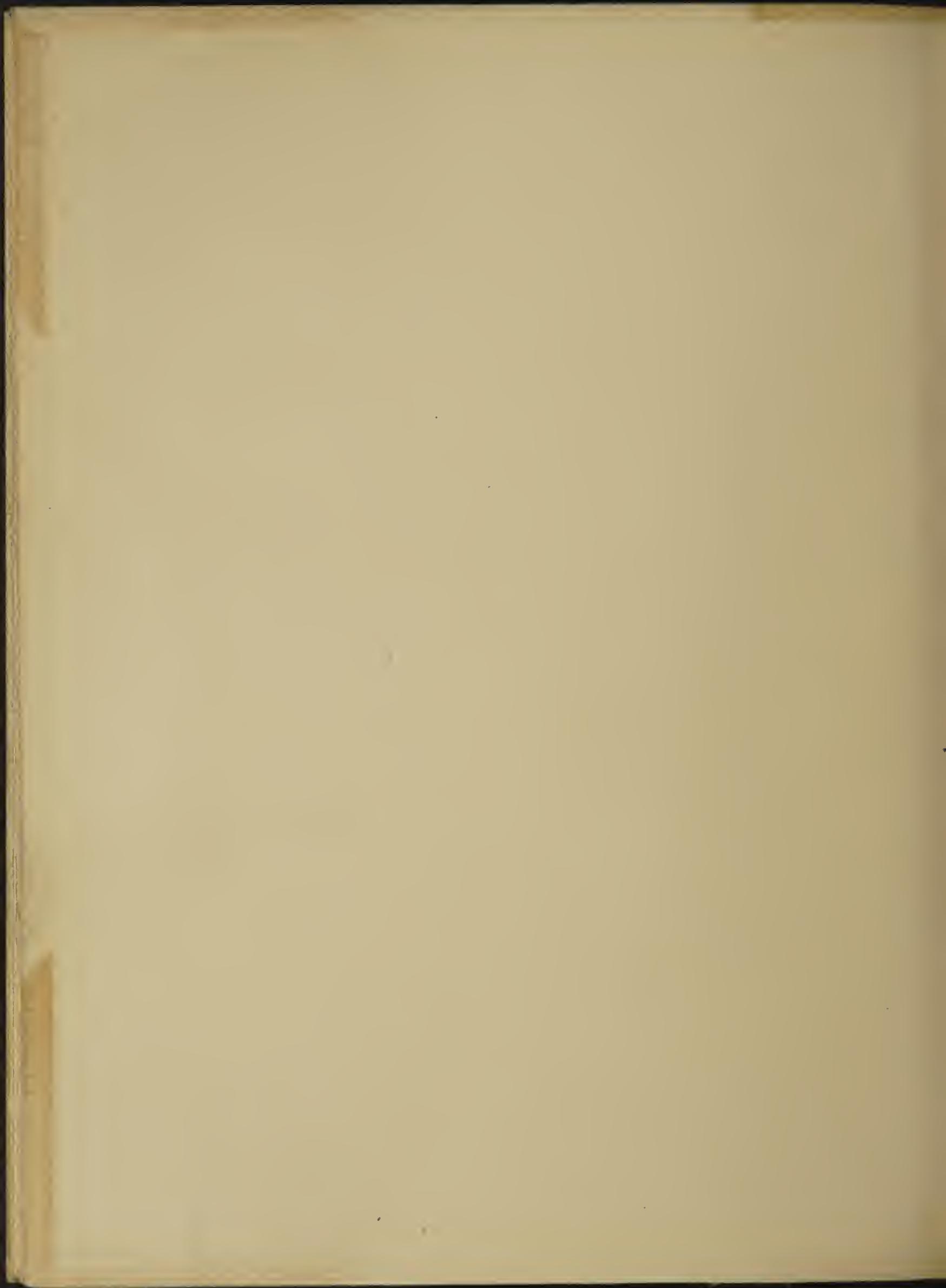












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